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ABSTRACT

A study was conducted to develop a conceptual framework for tech prep programs based on the perceptions of personnel involved in the planning and implementation of local tech prep programs. A structured conceptualization process called concept mapping was used to develop a pictorial representation of stakeholders' perceptions of tech prep. Using a set of 97 defining statements related to tech prep, documents were analyzed and individual and group interviews were conducted. Rating instruments were sent to 450 randomly selected tech prep stakeholders in Illinois, with 156 responses received. For analysis the responses were divided into four subgroups: state education staff, employers, secondary educators, and postsecondary educators. Clusters identified by the stakeholders using concept mapping were as follows: outcomes, planning and support, external involvement, articulation and integration, benefits, enrollment incentives, staff development, program components, and populations served. All subgroups were similar in their conceptual views of tech prep. Differences existed in their views on the importance of various factors, especially between state staff and others. The study showed that concept mapping is an effective tool for getting the stakeholder groups to conceptualize tech prep. It did not lead to a definition of tech prep, but it pointed further research in the direction of school- and work-based outcomes. (KC)

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Using Concept Mapping Techniques to Compare Stakeholder Groups' Perceptions of Tech Prep

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Introduction

The Perkins Act of 1990 defines Tech Prep programs as combined secondary and postsecondary programs which lead to the completion of an associate degree or two-year certificate, provide technical preparation in a specified field, build student competence in math, science and communications, and lead to employment. Within this rather broad definition, specifics such as instructional content, organizational structure, clientele, and delivery structures (to name a few) are left open to interpretation.

In Illinois, successful implementation of Tech Prep has been described as contingent upon the development of three important partnerships: (1) academic and technical educators (2) secondary and post-secondary educators, and (3) educators and business and industry representatives. In today's educational climate Tech Prep is expected to address serious problems through those partnerships (e.g., high dropout rates, deficits in work-place basic skills, keeping up with rapid advancements in technology, etc.). The Illinois State Board of Education (ISBE) has provided funding for the development and implementation of Tech Prep pilot projects to consortia of high schools and community colleges throghout the state.

The Tech Prep implementation guidelines provided by State staff supported and extended the intent of the Tech Prep initiative in the Perkins Act . The description was intended to promote a general understanding of Tech Prep in Illinois and to provide overall guidance to personnel involved in the Illinois Tech Prep projects. The local consortia were responsible for planning and implementation, that is, for determining what specific elements would comprise their Tech Prep instructional programs.

Purpose of the Study

Two years into the development of the Illinois Tech Prep programs, there was a need to describe the conceptual structure of Tech Prep as it was emerging in the various prototypes. The purpose of the study was to develop a conceptual framework for Tech Prep based on the perceptions of personnel involved in the planning and implementation of local Tech Prep programs. A conceptual framework was needed to enhance understanding of the perceptions of Tech Prep stakeholders throughout the state and to provide the basis for communication among stakeholders and policy decisions related to the Tech Prep prototype projects. Specifically, two sub-questions were addressed in the study:

1. How is Tech Prep conceptualized by:
   a. secondary teachers, counselors and administrators?
   b. postseondary instructors, counselors, and administrators?
   c. employers?
   d. state vocational education staff?

2. How do the various subgroups differ in their perceptions of Tech Prep?

Methodology

A "structured conceptualization" process referred to as *concept mapping* (Trochim, 1989) was used with key Tech Prep stakeholders to develop a conceptual framework which operationally defined Illinois Tech Prep as implemented at the local level. The concept mapping process as utilized in this study provided a

pictorial representation of the key stakeholders' perceptions of Tech Prep. More specifically, the concept mapping process displayed the major components of Tech Prep, helped identify relationships between the components, and identified the relative priorities placed on each component and cluster of related components. This representation facilitated discussions which served to identify themes and concepts underlying the key stakeholders' perceptions.

Sample Selection

Respondents for this study represented the entire population of all personnel involved in the design and development of funded Tech Prep projects in Illinois. This included state-level vocational education staff, directors of the 31 Tech Prep consortia, educators (administrators, faculty and counselors) from community colleges and secondary schools involved in Tech Prep consortia, and local employers involved in Tech Prep consortia. The list of 450 respondents was randomly selected from a population of over 2000 persons involved in Tech Prep, as identified by state vocational education staff.

Instrumentation

Trochim's (1989) concept mapping procedure requires that a set of statements which define the concept to be studies be generated by representatives of the population. First, the focus of the statements was established based on the following three questions: (1) What is Tech Prep? (2) What activities are important to the successful implementation of Tech Prep? and (3) What linkages are necessary to facilitate the implementation of Tech Prep?

Ninety-seven "defining" statements related to Tech Prep were generated through document analysis and individual and group interviews. Proposals and progress reports from 31 project sites were examined. Individual interviews were conducted with two private sector and two State education staff representatives. Conference calls were arranged to conduct five group interviews with a cross section of secondary and post-secondary Tech Prep personnel from several sites. Group interviews were conducted utilizing a brainstorming format. Ideas were collected until substantial redundancy appeared in the responses. Statements were consolidated and clarified to eliminate redundancy.

Two forms of instrumentation were developed. First, the 97 defining statements were each printed onto separate cards. Sets of cards were reproduced for each respondent. Second, four-point rating scale instruments containing each of the 97 statements were developed. The respondents were asked to first sort the statement cards into meaningful, mutually exclusive categories (Trochim, 1989). They were then asked to rate each statement on a scale of importance from 1 to 4, with 1 being "Not Important" and 4 being "Very Important".

Data Collection and Analysis

Card sets and rating instruments were sent to the 450 randomly selected persons representing Illinois Tech Prep stakeholders. For analysis, the population was divided into four subgroups: (1) State education staff, (2) employers (private sector representatives), (3) secondary educators (administrators, counselors, vocational teachers, and academic teachers), and (4) post-secondary educators (administrators, counselors, vocational teachers, and academic teachers). The 156 responses received included representation from all identified sub-groups, as follows: State

staff, 6 respondents; employers, 16 respondents; postsecondary educators, 35 respondents; secondary educators, 99 respondents.

The Concept System software (Trochim, 1989) was utilized to analyze and represent the sorted data into interpretable clusters. The software used multidimensional scaling to plot the statements as points on a map, and cluster analysis to partition the statements into clusters. A "bridge value" was computed for each point and an average "bridge value" was computed for each cluster. These "bridge values" indicated the relative consistency with which statements were sorted together thus aiding in the subsequent interpretation step. This information allowed interpreters to determine which statements within a cluster were sorted together most consistently and thus were most representative of the overall theme in that cluster.

Average ratings for each statement and for each cluster were computed to establish group perceptions of importance by idea and cluster topic. Ratings data were not utilized in the construction of the cluster maps. The importance ratings were valuable because they allowed the examination of the respondents' thinking from a second perspective. The concept maps illustrated what concepts respondents grouped together, and the ratings data allowed respondents to describe their perceptions of priority for each concept.

The maps and cluster lists generated by the concept mapping analysis were then subjected to interpretation by study respondents. Two small groups, one representing study respondents, the other consisting of secondary, postsecondary and university educators, performed the interpretation in two separate settings. The participants identified predominant themes and relationships apparent in the statements contained within the clusters. Researchers then compared the interpretations of the two groups for consistency.

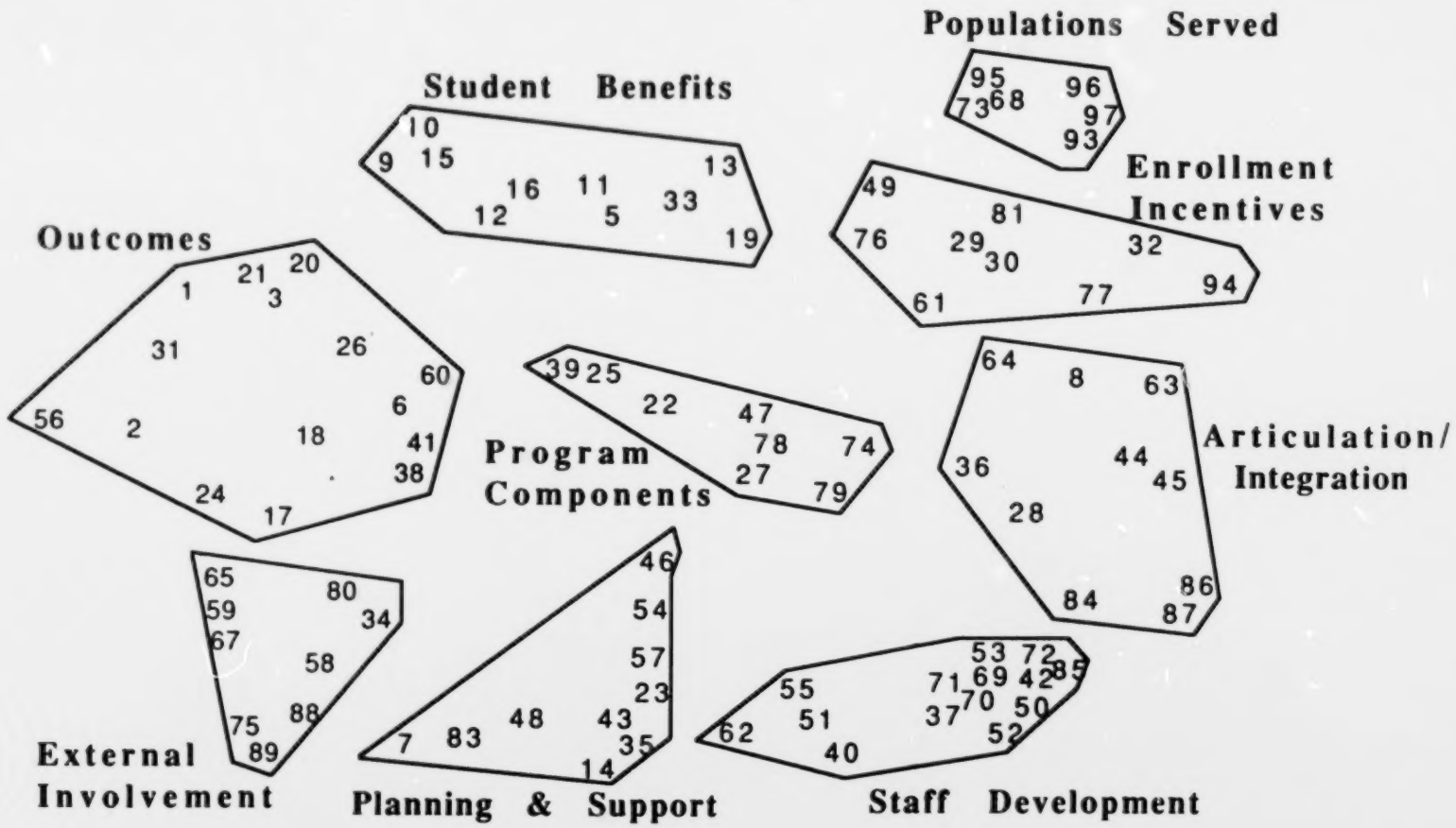
Results

This study assessed the perceptions of Illinois stakeholders, and compared the perceptions of four subgroups (secondary educators, postsecondary educators, employers, and State education staff) regarding Tech Prep. All of the respondents were intimately acquainted with Tech Prep both conceptually and as it is presently being implemented in Illinois.

Overall Conceptualization of Tech Prep

The concept mapping procedure produced statements clustered into relatively homogeneous groupings based on relationships perceived by the stakeholders. Graphic or pictorial products emerged which simultaneously displayed major ideas and their relationships. One major product was the generation of clusters of statements each with some theme or identifiable thread of conceptual continuity. These clustered statements began to present a framework against which to interpret the large volume of information that will subsequently be gathered as Tech Prep is further explored and evaluated in Illinois. The overall stakeholders' cluster map is presented in Figure 1.

TECH PREP DEFINITION CLUSTER MAP



The relative placement of clusters of statements on the map is important. Clusters which appear in closer proximity on the map contain statements which have more similar themes. As an example, the *Outcomes* cluster is more similar in theme to the *Benefits* cluster than either are to the *Staff Development* cluster. The following clusters were defined and identified by the critical stakeholder groups:

- The *Outcomes* cluster statements included a combination of programmatic and individual outcomes often expressed in an assessment context.

- The statements included in the *Planning and Support* cluster related the process aspects of planning and support to implementation and evaluation.

- The statements contained in the *External Involvement* cluster also related the process aspects of planning and support to implementation and evaluation. The External involvement cluster differed from the Planning and Support cluster in that it began to define the roles external entities may play in Tech Prep programs (e.g., planning and development, support, delivery, and evaluation).

- *Articulation/Integration* cluster statements described linkages based on collaboration between vocational and academic faculty, between both secondary and post-secondary institutions and faculties, and between education and the private sector.

- The statements sorted into the *Benefits* cluster described a theme similar to that evident in the Outcomes cluster, but the themes described here were divided between benefits to students as individuals and benefits to the organization or program.

- The *Enrollment Incentives* cluster statements detailed process components of Tech Prep that attempt to meet individual needs, particularly the very individualized needs of the special populations student.

- The *Staff Development* cluster presented a collection of statements containing a consistent collaborative theme. These statements emphasized the importance of team activities and cooperation between the various subgroups in the implementation of Tech Prep.

- The *Program Components* statements were a loosely associated group of statements with a program processes theme.

- The *Populations Served* cluster statements identified for whom Tech Prep is intended, the students that Tech Prep should serve.

Conceptual Differences Among Subgroups

Four major subgroups were identified within the overall population: (1) secondary educators (teachers, administrators, counselors), (2) postsecondary educators (instructors, administrators, counselors), (3) employers, and (4) State education staff. Concept maps were developed and interpreted for each of the subgroups. Comparison of the maps established conceptual differences among the groups in their perceptions of Tech Prep.

Overall, it may be said that the subgroups were more similar than different in their perceptions of Tech Prep. The cluster themes listed above were common to virtually all subgroups, but there were some interesting differences in the way those themes were organized. The following sections will examine the perceptions of each subgroup using three organizers: processes, relationships, and products.

Processes

Generally, clusters which addressed processes were concerned with staff development, planning and implementation, and delivery of instruction. One cluster which was common in structure and content for all subgroups dealt with target populations, or clientele for Tech Prep programming. This was due, at least in part, to the wording of the statements which comprised the cluster. Each statement began with the phrase "targeted for..." In that sense, those statements were almost pre-clustered prior to any analysis or sorting by the participants.

Another common cluster theme was articulation. All subgroups identified a cluster which dealt in some way with establishing formal links between the secondary and postsecondary levels within Tech Prep programs. State staff and also secondary educators tended to view these linkages conceptually more as outcomes or benefits of Tech Prep rather than as process elements.

Relationships

The theme "collaboration" was prevalent in several clusters. All subgroups connected the concept of collaboration to staff development, implying that staff development for Tech Prep needs to involve all stakeholder groups, and that they all need staff development to implement Tech Prep successfully. Secondary and postsecondary educators identified a "business and industry linkages" cluster theme, indicating that formal structures be developed to ensure equitable participation of business and industry in Tech Prep development. Employers and State education staff approached this theme as a curricular function. In other words, their concept of linking with business and industry was ensuring that curricula meet the needs of business and industry. All subgroups identified the need for inter-agency and intra-agency support in Tech Prep planning and development.

Products

All subgroups except the state education leaders identified a distinct cluster based on outcomes. State education leaders dispersed statements related to student and program outcomes among various other clusters with themes like "benefits" or "program quality." The secondary and postsecondary educators, and the employers, identified specific clusters in which outcomes-related statements were concentrated.

Secondary educators and state education leaders identified "image" as a cluster theme, while the postsecondary educators and employers did not. The proximity of the image cluster to other outcomes-related clusers on the maps revealed that a positive program image was seen as an outcome of Tech Prep.

Perceptions of Importance

The second part of the study asked respondents to rate the importance of each defining statement on a scale of 1 to 4 (1=least important, 4=most important). This activity served to (1) prioritize the cluster themes, (2) identify salient individual statements, and (3) facilitate comparisons among the various subgroups.

Cluster Priorities

Average priority ratings were calculated for the identified clusters. In descending order, the priority of each cluster was as follows:

Cluster Theme	Mean Importance Rating
Outcomes	3.31
Planning and Support	3.23
External Involvement	3.19
Articulation/Integration	3.19
Benefits	3.18
Enrollment Incentives	2.96
Program Components	2.83
Populations Served	2.70

Highest Individual Item Priorities

Fourteen statements were almost universally accepted by the major sub-groups as items of the highest importance (mean ratings of 3.5 or above) in the implementation of Tech Prep.

1. Improved communication, math, science, and computer skills
20. Improved work readiness
21. Improved problem solving skills
31. Improved perception of technical careers
9. Improved student motivation for learning
10. Improved student self-esteem
48. Appropriate facilities and equipment
83. Board support for Tech Prep concept and programs
58. Business & industry involvement in developing tech prep curriculum
65. Employer feedback on student performance
28. Integrated vocational and academic courses
36. Applied curriculum materials in math, science and communication
84. Secondary and post-secondary teacher collaboration
16. Increased number of high school and community college graduates
85. Counselor, teacher, administrator collaboration

Subgroup Comparisons

To explore interactions within the ratings data, analysis of variance was run on the ratings data using secondary and post-secondary level variables and academic teacher, vocational teacher, counselor, administrator and employer as employment status variables. Significant differences at the .05 level were then subjected to a

Scheffe test to identify significant differences in group ratings, again at the .05 level.

Of 97 defining statements generated, only three statistically significant differences in importance ratings existed between secondary and postsecondary educator subgroups. These are summarized below.

Statement	Secondary Mean	Postsecondary Mean
69. Vocational/academic teacher teams	3.38	2.97
70. Joint planning time	3.45	2.97
93. Targeted for students who learn better through application	3.44	2.97

There were statistically significant differences between employer and educator importance ratings on six of the defining statements.

Statement	Educator Mean	Employer Mean
7. Local budgetary support for Tech Prep	3.58	2.56
14. Building-level administrative support	3.59	2.73
75. External funding for Tech Prep activities	3.39	2.38
89. State and local government involvement	3.26	1.94
55. Tech Prep site coordinators	3.18	2.12
70. Joint planning time	3.39	2.44

Importance ratings of State education staff were significantly different from those of employers for four Tech Prep defining statements.

Statement	State Staff Mean	Employer Mean
14. Building-level administrative support	3.67	2.73
75. External funding for Tech Prep activities	3.17	2.38
55. Tech Prep site coordinators	3.17	2.12
70. Joint planning time	4.00	2.44

In studies where sample size is small, statistical differences may fail to appear due to low power. When this occurs it is possible to look at the pattern of non-significant findings and predict where we might expect to find significant differences if we had more power in the study to pick up those effects. It is important to remember that differences do not have to be statistically significant to be important (Dumont, 1989; Minium & Clark, 1982). The small size of the State education staff group provides just such a case. In comparing the State educatin staff group importance ratings with other groups it was determined that mean differences of 1/2 standard deviation or more, while not statistically significant, are important enough to warrant further attention.

State education staff rated several statements more than .5 standard deviation higher than at least one of the other subgroups. Some of the more interesting examples follow (the other subgroup to which the State education staff rating is compared is identified in parenthesis).

21. Improved problem solving skills (educators)
24. Achievement of state goals for learning (educators)
28. Integrated vocational and academic courses (employers)
23. Increased interagency collaboration (employers, educators)
12. Increased number of graduates from two-year occupational programs (educators)
81. Academic assistance for students unable to meet entrance requirements (educators, employers)
30. Paid internships for Tech Prep students (employers)
22. Instruction and experience in all aspects of industry (educators)
89. State and local government involvement (employers)
87. University personnel involved (employers, educators)

Also, several statements relating to the theme of collaborative staff development and delivery of instruction were rated at least .5 s.d. higher by state education leaders than by either educators or employers.

Only a few statements were rated .5 s.d. lower by State education staff than by educators and employers. Most potentially important among these were:

26. Certification of completion and competency achievement
7. Local budgetary support for Tech Prep (e.g., matching equipment funds)
15. Improved career awareness

Discussion of Results

The study yielded more information about elements which are important for implementing Tech Prep programs than about the structure of Tech Prep. The information gained in the study should prove very beneficial in guiding future program planning and evaluation efforts. It did not, however, lend itself to a concise definition of the Tech Prep concept.

All subgroups were similar in their conceptual views of Tech Prep. One interesting difference was the issue of program image, which was identifed as a cluster by secondary educators and State education staff. These two groups have been concerned for many years about the perceived negative image of vocational and technical education. Both appear to view Tech Prep as a vehicle for altering that image. This also indicates that both view Tech Prep as being closely tied to vocational and technical education.

More tangible differences existed in the importance ratings. Significant and/or potentially important differences in perceptions of the various subgroups regarding the relative importance of Tech Prep elements were found in the responses to 51 of the 97 statements. Two of these differences occurred between practitioner subgroups, three between the secondary and postsecondary groups, six between employers and educators, 29 between State education staff and educators and 40 between employers and State education staff. Why did these differences exist?

How should they be interpreted? Which present the greatest threats or strengths upon which to build?

Two of the significant differences between secondary and postsecondary educators were related to vocational/academic instructor collaboration. Secondary staff perceived this as more important, not surprising given the emphasis at the secondary level on vocational/academic integration strategies which involve teacher collaboration. Postsecondary educators tend to view vocational/academic integration as a function of course-taking patterns rather than of teacher collaboration.

Many of the statements rated as more important by educators than by employers reflected "internal" educational concerns (e.g., administrative support, government involvement, site coordinators). Educators are concerned with how Tech Prep program initiatives will be supported, both financially and with other internal and extrernal resources. Employers appear to be more concerned with program content and its relationship to their needs.

Many potentially important differences in importance ratings were between State education staff and everyone else. Most of these differences were simply due to the fact that the State education staff rated more statements higher than the other subgroups. State staff receive input from educators and employers, as well as from federal and state legislators, policy leaders, university staff, and personnel from other states. They tend to have a much larger picture of Tech Prep than do local educators or employers, and are therefore concerned with many facets of the programs, rather than focusing on competency attainment (rated higher by employers) or local budgetary support for programs (rated higher by educators).

Implications

Concept mapping proved to be an effective tool for getting the stakeholder groups to conceptualize Tech Prep. Due to logistical factors, the specific methodology used for this study was somewhat different and perhaps more cumbersome than that described by Trochim (1989) but this also proved that concept mapping techniques could be adjusted and still produce viable results.

Given the importance of effective leadership and policy making, it is essential that State staff communicate their perceptions to educators and employers. They are viewing Tech Prep from a much broader perspective, one which is not always clearly perceived in the local communities. Increased awareness of the many inputs into Tech Prep programmatic decisions could make these decisions more palatable to local personnel and employers. Also, if local consortia are to be held accountable for certain aspects of Tech Prep programs, they must know which aspects are viewed by state leaders as most important.

Further research and evaluation should focus heavily on both school and work based student outcomes. Specific outcomes to be assessed were identified through the priority ratings. Thus an important component of further Tech Prep evaluation will be the collection and use of student outcomes data.

Given the degree of general agreement between employers and educators, further research should focus on the partnerships in Tech Prep. What are the roles and responsibilities of educators and employers in the local Tech Prep planning

partnerships? What variation exists in the structure and function of Tech Prep partnerships within local consortia?

Identifying a specific target audience for Tech Prep is not an important issue. The results of the study indicate that stakeholders perceive Tech Prep to be appropriate for a broad audience, well beyond the middle 50th percentile so often identified as the prime clientele. Therefore, further evaluation should examine what students are currently identified as Tech Prep students and whether Tech Prep programming is reaching beyond "traditional" audiences .

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